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SOME FISH-NOTES FROM GREAT YARMOUTH FOR 1911.

By ARTHUR H. PATTERSON.

NOTWITHSTANDING the extraordinarily fine weather which characterized the summer and autumn of 1911, fishes, rare or interesting, such as we might have expected under existing conditions, were conspicuously absent. I have pleasure, however, in adding a Skate, which I take to be a good species, hitherto unrecorded for Norfolk, *viz.* the Sandy Ray.

One or two common species, at the beginning and at the latter part of the year, put in an appearance in remarkable numbers, affording local amateur fishermen considerable sport. An inset of Codlings was a marked feature of January. For two consecutive days I noted the number taken from the Britannia Pier: the summary which follows may be of some interest:—

Wednesday, 4th January.

Mr. Stone.....	18	Codfish	...	Weight, 44 lb.
Mr. Fuller	6	"	"	20 "
Mr. Salmon	5	"	"	14 "

Thursday, 5th January.

Mr. Brown	3	Codfish	...	Weight, 12 lb.
Mr. Chappel ...	20	"	"	50 "
Mr. Dalinger ...	14	"	"	35 "
Mr. D'Olier	10	"	"	25 "
Mr. Carr	10	"	"	27 "
Mr. Rolling	9	"	"	20 "
Mr. Sweet	6	"	"	19 "

Total 266 lb.

The largest single Codfish taken in the autumn by an amateur was captured by Mr. Pownell, who was fishing from a boat in the roadstead on October 21st; weight, 20 lb. 15 oz.

During January a number of beachmen laid long lines in the roadstead, baiting with Mussels, and had very fair catches; they brought their fish to the Marine Parade, displaying them on net-barrows, and selling them to passers-by. On the 11th, five hundred Cods of goodly size were landed.

I made arrangements with a fish-hawker to send me the stomachs of freshly caught Cods. On the 10th several were brought; I found the contents included *Cancer pagurus*, *Hyas coarctatus*, *Pagurus bernhardus*, *Xantho rivulosa*, "brown" and "pink" Shrimps, and Sea-Mice. On the 16th six stomachs came in. I found one fish had packed away no fewer than thirty lugworms in various stages of dissolution, but all of them distinguishable, some being only recently swallowed. Several Hermit Crabs, without whelk-shells, were found in others, with Whelks, also shell-less. One *Cancer pagurus* was $2\frac{1}{2}$ in. across the carapace. What fishes I discovered were in such condition that identification was impossible.

January 17th my fish-hawker friend, Jerrard, brought me no fewer than fifty-seven bellies—stomachs, with all the other organs attached! It was a very cold occupation turning out and sorting the contents. The mixed "bag" my confederate described as having been taken from fish purchased on the fish-wharf—a mixed lot from Corton, Winterton, and off the town. The various Cods were easily detected by their food, which was characteristic of the localities mentioned: from Winterton there came lugworm-eaters; from Corton the food was Sprats; and from the Yarmouth ground *pagurus*. I made Jerrard remain while I dissected the stomachs, and returning the whole to his bucket, suggested he should drop the lot in the river on his way home, which he did.

Among the more unusual captures made by sea-anglers from the piers were a Skulpin (*Callionymus lyra*); a Salmon-Trout; a double Flounder; and, I believe, as many as four Scads in one day. These latter were taken quite close to the piles whereon are many Sea-Anemones and other marine creatures, by which these fishes were probably attracted. A rare catch in the shape of an $8\frac{1}{2}$ lb. Conger was made from Britannia Pier.



early in November. On November 13th I received from Mr. Beazor, a fish-merchant, the largest Skulpin I have ever seen; it was gilled in the drift-nets with the Herrings, a unusual ending for so ground-loving a species.

The annual Sprat-dinner took place at Aldeburgh on January 18th. In one of the after-dinner speeches some interesting facts with regard to the Sprat fishery were given. German buyers had, the previous November, bought up large quantities, giving an impetus that was much appreciated, a glut previously having been equally as unremunerative as a scarcity. Smoked or "dried" Sprats were a disappearing feature. The figures of catches given for certain years were as follow:—1906, 1190 bushels; 1907, 2988 bushels; 1908, 8828 bushels; 1909, 988 bushels; 1910, 6620 bushels. The prices of the 1908 catches ruled very low. One speaker said that, although the present season had been a fair one, not a man made more than £10, whereas forty years ago a man could clear as much as £30. The fishermen went out to catch Sprats on days when they had no business to venture out; a foggy, misty night is preferable for spratting to a fine one.

On January 30th I received a note from Mr. Cook, of Lowestoft, informing me that some catches of Cods taken on long lines in that neighbourhood realized, when sold on the fish-market, the following prices:—Catch of 43 fish, £1 10s. 6d.; 36 fish, £1 19s. 6d.; 49 fish, £1 14s. 6d.

On January 30th I examined some so-called Sprats that were being hawked around the town, finding them mostly "yawlers" (probably derived from "yearlings"), or young Herrings a span long; only one-tenth were Sprats, a shameful netting of next to useless fish.

I obtained on January 31st a Streaked Gurnard (*Trigla lineata*) that had in all probability been taken off Cromer Knowle.

John-dorys were still abundant at the end of the month off the north-east coast of Norfolk. They ran about the size of one's hand. In one I discovered a Herring, and in another a Whiting. There was no ready sale for these fishes, but I found them exceedingly savoury, when, simply divested of head and fins, they were placed to fry in the fry-pan. The skin then peeled off easily, and the two sides came away boneless. The

flesh ate like that of the Weaver, with a piquant suggestion of seaweedy aroma.

February 11th. Several 1 lb. Flounders brought me from Lowestoft. Of three females I examined and ate, one with an unbroken roe was firm and well flavoured; a second in process of spawning was soft, limp, and flavourless. Evidently the species deteriorates rapidly by the process.

A glut of 10 in. Greater Weevers (*Trachinus draco*), hawked around the town, from the north-east coast of Norfolk.

A huge Eel, 64 in. long, $21\frac{1}{2}$ in. in girth, weight $32\frac{1}{2}$ lb. From the description and sketch sent me by a friend, who saw it exhibited at Lowestoft, I have little hesitation in recording it as a barren female; it compared in almost every particular with one I saw at Yarmouth on September 30th, 1909 (cf. 'Zoologist,' 1910, p. 65), which weighed 24 lb.

[I cannot claim for my Yarmouth list of fishes the Pennant's Globe Fish (*Tetrodon pennantii*, Yarrell). On February 27th I was fortunate in seeing a fairly well-preserved example of this species in the house of a woman whose husband discovered it among a "shot" from the trawl-net (so she informed me) when fishing in the North Sea, at no great distance from the county, in one of the Hewett's smacks (a long since dissolved company). He had himself preserved it. I give the record for what it is worth.]

A noticeable movement of the Bib (*Gadus luscus*) or "Whiting-pout." Fairly common off Aldeburgh, well-grown, it is not frequent north of Yarmouth, but quite a number taken early in March in the neighbourhood of Cromer Knowle. Very immature examples are plentiful enough in the local shrimpers' nets in early summer.

I saw a "Slinky" Cod on March 24th of some length, but most disreputable for its leanness; it was a veritable skeleton, encased in a shrivelled-up skin. It exhibited no parasites, usual in such examples; and had evidently been blind before capture in a net. Some blowing-up of wreckage in the sea near by had taken place, and it is just probable that an explosion may have injured it.

Megrim (*Arnoglossus laterna*), a 6 in. example brought me on March 28th.

May 20th. When passing a fish-shop on this date, my attention was arrested by two very fresh "sides" of a Skate

(the head, "dock," or body, and tail having been removed) spread on the slab among some Norfolk Thornbacks. Its unusual colour—a decided drab—at once reminded me of Couch's Sandy Ray (*Raia circularis*). On comparing these sides with Couch's figure I found it an exact replica, the distinguishing "ocellated spots, the size of the section of a large pea, the centre yellow, the border a deeper impression of the colour of the ground," were identical. In all other particulars there was a correspondence. Day ('British Fishes'), however, does not give this fish specific distinction, but for some reason places it under the heading of Cuckoo Ray, a species I am familiar with. In the 'Vertebrate Fauna of Yorkshire' (Clarke and Roebuck), the Sandy Ray as *circularis* is given, and referred to as "abundant in Bridlington Bay, frequently met at Scarborough, and once at Whitby." Matthias Dunn, of Mevagissey, considered the Sandy and Cuckoo Rays as quite distinct,* a decision with which I am in agreement. As the fish, with others, was undoubtedly taken off the Norfolk coast, I feel safe in placing it on the county list.

Saw a whole blue-backed Mackerel, 16 in. in length, on May 24th. The first dorsal fin numbered ten rays, the second eleven rays. Day describes it as *Scomber concolor*, a mere variety of the type. I find examples taken yearly by the Mackerel-boats, their length averaging $15\frac{1}{2}$ in.; and to me the body appears more slender for the length when compared with *S. scomber*. Is it possible that it may be a distinct species?

Some large Herrings were taken in June, some of them 14 in. in length; this is unusual for the spring fishing, and in local

* He writes:—"Since 1884 I have given the Skate family more than my usual attention. . . . In Mr. F. Day's works the Cuckoo and the Sandy Rays are given as belonging to one species. . . . The full-grown Cuckoo Ray is seldom found above four pounds weight, while the perfect male of the Sandy Ray is from fifteen to eighteen pounds weight. . . . Looking into the anatomy of the two, it was seen that in the spinal columns between the skull and the ventral fin the Cuckoo Ray has twenty-nine vertebræ, while the Sandy Ray, under like conditions, has thirty-six vertebræ. Moreover, the males of the Cuckoo Ray are in the proportion of about one to three females; while, in the Sandy Ray, I have only met with four males in ten years, and in the same time I could not have seen less than one hundred females" ('Notes on the Skates and Rays of Cornwall,' 1888). I am surprised he has referred to neither markings or coloration (A. H. P.).

waters. Most of the fish that size I have observed in the boxes sent over from Norway, taken later than our autumnal fishing.

A Scribbled Mackerel, 14 in. long, brought in on June 14th. Very rarely does this variety exceed 15 in.

The summer Mackerel fishing was not up to the average. The first catch came in on May 3rd, the last on July 20th. The recorded catch was about 175 lasts. They averaged something like eleven shillings a 100—of 120. During the autumnal Herring fishery the Mackerel were not so abundant as in some years, but very fine specimens came to the wharf. Fewer boats followed the fishery this year, and I believe only one specially fished with Mackerel-nets during the Herring voyage.

The want of some salutary legislation with regard to the catching of Herrings is sorely needed. Some catches of absurdly small Herrings, nine inches in length, were arriving from North Shields. Some I saw were, however, slightly deeper in proportion as compared with our own autumnal fish. No close season obtains, and fishing takes place more or less nearly all the year round; not even is there a Sunday respite, for the boats fish seven days a week. One day's immunity a week would be beneficial. Added to this untimely catching, Grimsby *trawlers* fished off the Yorkshire coast in the early autumn of 1911, a new departure which promises disaster, when it is known that the trawls relentlessly sweep across and across the spawning-grounds. When it is well known that trawling has long depleted the North Sea of Haddocks (which fifty years ago were taken off Yarmouth, where none are now found), and other marketable species, and cut up the feeding-grounds, it is easy to foretell a like result with the Herrings. Anyway, any large increase in trawling must seriously affect the drift-net fishermen. The fish taken were exceedingly fine ones, but sadly "rubbed," and denuded of scales, which rendered them utterly useless for certain modes of cure.

July—an extraordinary month for various Medusæ, which teemed in the North Sea.

Double Plaice: Saw a Plaice (*Pleuronectes platessa*) on Aug. 31st. It was dark coloured on both sides save for the under "cheek," which was white. The orange spots were distributed alike, above and below. There was a notch in the head wherein

the "travelling" eye was located. I sent it to Norwich Museum. On Sept. 10th I met with another exactly like it in every respect. Probably they were of the same brood. The first was one foot in length, the second a line or two longer.

Dead Eels by hundreds were seen at Oulton Broad, near Lowestoft, floating on the surface. Various reasons were suggested for the fatality, but undoubtedly the action of the acute and continued heat upon subaqueous vegetation accounted for the pollution of the waters; and to pollution Eels are very sensitive.

An immense quantity of "Herring-syle" was noted on Breydon and well up the local rivers during the hottest months; myriads of lively little fry, flashing like streaks of burnished silver, freckled the waters as they turned, as might heavy rain-drops. Early in September one of the marsh-ditches abutting on to the Waveney was found to be fairly alive with them, having come in with brackish water in company with numerous small Perch (*Perca fluviatilis*). A friend of mine who was "lamb-netting" secured as many as two thousand of these young Herrings at one lift of the net. I have no doubt that they either returned to the tidal waters when the sluice-gates were re-opened to let out the surface-water, or most likely were well-fished by the Herons, scores of which in summer alternate their fishing operations for Eels and Flounders on Breydon with spells in the ditches for Sticklebacks, small Pike, and other inhabitants of different orders.

A great many Scads (*Trachurus trachurus*), or "Horse-Mackerel," were taken in the Herring-nets during the autumnal fishing. These were variously sized, but invariably thrown away. Dozens are kicked about on the quays, and numbers thrown from the nets wash up on to the beach. There is a strong local prejudice against the fish, and very few people will trouble to cook it. I abstracted a fresh Scad from a basket of Herrings, and, having washed and hung it to dry for a few hours, had it skinned and fried. It was, to my mind, a very savoury fish, and ate very much like a cross between a Mackerel and a Weever; the flesh was juicy and firm, and there was little trouble from bones, which I cannot say of the Garfish (which I also tried boiled, and found excellent eating), for tiny sharp-pointed bones were a source of much annoyance.

An extraordinary inshoring of Whittings took place in October and November, when sea-anglers, from veteran sportsmen to tiny urchins, repaired to the piers and sat armed with all sorts and conditions of tackle, returning often with big catches. Some urchins discovered a sort of basin at the harbour-mouth works, wherein at low water a number of small Whittings were daily imprisoned when the tide fell. It is needless to say that this pool was well fished, and occasionally a surprising number of fish were captured, the boys using a quill-float in the still water, and thoroughly enjoying their novel method of fishing.

On November 12th I received from a Mr. Allen, of Cromer, an hermaphroditic Herring. He had slightly cooked the fish, and was about to eat it, when its queer mingling of roe and milt caught his attention. I found the milt a third larger than the roe, which fitted into the male organ somewhat after the fashion of a razor-blade in its handle, and was similarly proportionate.

Mr. Robert Beazor, Sen., fish-merchant, informs me that the Smelt fishery was below the average, the long-prevailing winds from the south-east making the working of the Gorleston nets impossible owing to the surf; and the water on easterly winds is so "sheer" (transparent) that the fish are not so easy of capture as when the water is "thick" or "muddled." The latter conditions also apply to the rivers and Breydon. I believe the Dutch fishing was much more remunerative. Mr. Beazor mentions a considerable capture of Salmon-Trout in September-end, when in a few days there was a goodly supply; these mostly come from the sea-coast villages north of Yarmouth. His heaviest Trout was one weighing $10\frac{1}{4}$ lb. The midsummer Herring fishery was below the average. Two Herrings he secured measured and weighed respectively: one, 16 in. long, 16 oz.; one, 15 in., 15 oz. I myself did well one day in the early autumn; with one sweep of a Smelt-net I secured one hundred and twenty fair-sized fish on Breydon.

Norfolk Seals.—That the Common Seal (*Phoca vitulina*) has become not only quite abundant on the sand-banks of the Wash, but a pest to the line-fishermen, is very apparent, and some small stir has been made by those interested with a view to

thinning out its numbers. At a recent meeting of the Eastern Sea Fisheries District Committee a member asserted that the damage done by Seals was enormous; fishermen frequently hauled in their lines with only Cods' heads attached, and in some cases they had been cleared altogether. It was suggested that the skins of any shot could be sold to the tanners for from five to ten shillings; for what purpose they could be utilized I am at a loss to suggest. The Fishery Inspector has seen as many as two hundred at a time on one of the sand-banks; he suggested that the Government send one of their small gun-boats, as their weapons could easily get within range, and not only kill but frighten. About one thousand Seals frequented the banks in the Wash. It is interesting to the naturalist to hear that such a thriving colony is still to be found in such busy waters as the Norfolk estuary. Two large Seals were discovered asleep under the shelter of the sand-hills on Yarmouth south beach late in October, having undoubtedly come from their favourite quarters on strong flood-tides. They were quite as surprised as the person who discovered them, and scuttled down to the sea in a violent hurry.

Other than one or two very small dead Porpoises in a deplorable condition, no cetaceans were thrown on the beach. But at Lowestoft, on October 16th, as already recorded (*ante*, p. 428), I saw the badly decomposing carcase of a Lesser Rorqual Whale (*Balænoptera rostrata*). Strangely enough, near the same date, another carcase of the same species was washed ashore at Sizewell, on the Suffolk coast. It was headless, the remaining portion covering a length of 22 ft. It must have been identical in size with its Lowestoft relative. I do not know how to account for their demise and stranding. It is just possible they were derelicts from the Norwegian small Whale fishery that may have escaped, and been finally stranded after having drifted southwards on successive tides.

Early in October my nephew, who serves on board the 'Leman and Ower' lightship, reported seeing an immense shoal of "Scouters" (probably Bottle-nosed Dolphins?), numbering, he thought, hundreds; they were continually breaching and disporting themselves, a lively mode of progression that would make count very difficult. They were working southwards.

THE PHARYNGEAL TEETH OF FISHES.

BY COLONEL C. E. SHEPHERD (Indian Army).

(Continued from p. 141.)

THE *Sparidæ* (Sea-Breams), and the *Labridæ* (Wrasses), beyond belonging to the Perciformes division of the suborder Acanthopterygii, or spiny-finned fishes in the order Teleostean fishes, have very little in common, except that many members of each of these families feed largely on Mollusca. It is interesting, then, to compare the way that their dentition, especially that of their pharyngeal teeth, has been arranged to meet the case of such very hard feeding. The *Sparidæ* get over the difficulty by strong crushing molar-like teeth being provided in the forward part of the jaws (see the teeth of *Pagrus auratus*, figs. 2 and 3). Crushed on entering the mouth, the ordinary shaped pharyngeal teeth can deal with the food as it passes on to the œsophagus. The *Labridæ* have not this crushing power in the forward part of their jaws, but are provided with strong pharyngeal teeth, well adapted to the work they have to perform, as will be detailed later on.

SPARIDÆ. (THE SEA-BREAMS.)

PAGRUS AURATUS. The Gilthead. Fig. 1 (p. 451).

There are seven gill-rakers on the first branchial arch from the angle forward and seven up its epibranchial; they are roughened on the inner side. The inner aspect of the first arch, both sides of the other arches except the fifth, bear tubercles which have a roughened surface. The upper pharyngeals have strong cardiform teeth, the points showing as white flecks; this is even apparent in the illustration (fig. 1). The plates of teeth do not show any distinct division, although this can be traced by a row of strong teeth along it. Strong cardiform teeth are visible amongst the lower pharyngeal teeth. The lower jaw (fig. 2) and the upper jaw (fig. 3) of this fish are figured to show the strong

molar-like crushing teeth in the forward part of the mouth for crushing the shellfish on which it feeds. There being this provision, the usual cardiform pharyngeal teeth found in so many fishes are enough to deal with the food once it has passed them. Food consists of fish, crustaceans, molluscs, echinoderms, and seaweed.

PAGELLUS CENTRODONTUS. The Common Sea-Bream.

There are ten horny gill-rakers on the first epibranchial, going high up, with sixteen on the cerato-hypobranchial portion

SPARIDÆ.

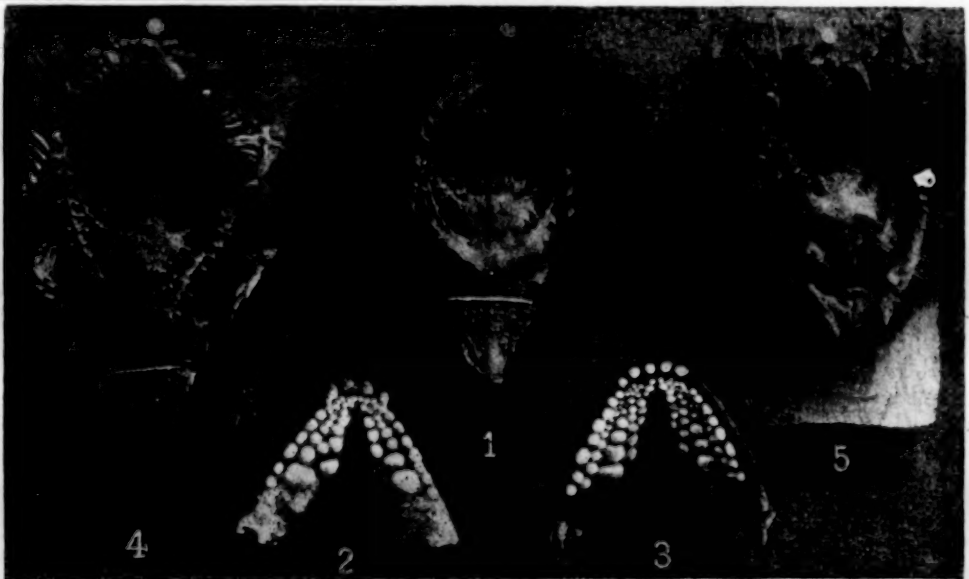


Fig. 1.—*PAGRUS AURATUS*; 2, lower jaw of ditto; 3, upper jaw of ditto.

Fig 4.—*CANTHARUS LINEATUS*.

Fig. 5.—*BOX SALPA*.

of the first arch. The longest on this portion are about one and a third the depth of the gill below them. Along the cerato-branchial portion they keep fairly uniform in length, diminishing along the hypobranchial portion. The upper pharyngeal teeth are cardiform, and set in two oval-shaped shields, with the more prominent teeth in the upper part of the patch; the teeth are very thickly studded over these pharyngeal bones. The lower pharyngeals seem to meet across the floor of

the mouth, but the two arch bones are separate; a row of larger cardiform teeth than the rest of the lower pharyngeal teeth are set along the inner margin in front of the œsophagus.

PAGELLUS MORMYRUS.

The upper pharyngeals are seen as three well-defined patches bearing villiform teeth; they fit together, looking at the first glance like one broadly oval patch.

CANTHARUS LINEATUS. Old Wife (Couch). Fig. 4 (p. 451).

The first branchial arch has fifteen horny, toothed on the inner side, gill-rakers as its cerato-hypobranchial portion, and nine going up the epibranchial. On both sides of the second and third, and on the inner side of the first arch, there are tubercles that are covered with stiff bristles that stand up over their summits. The upper section of the upper pharyngeal teeth consists of strong cardiform teeth set in a circular form at the top of the upper patch. The circular patch below the upper one carries the same sort of teeth, well-developed in its upper portion (fig. 4), less so as they get nearer the œsophagus. The lower pharyngeals have a row of strong cardiform teeth, making portion of circular sweeps convex to the œsophagus, the rest of the surface of the lower pharyngeal bones being covered with smaller cardiform teeth. The food of this fish consists largely of molluscs and crustaceans.

SARGUS RONDOLETTII.*

There are ten gill-rakers on the first cerato-hypobranchials, with seven on the first epibranchial; the gill-rakers have minute bristles, rather than teeth, on them, as they do not respond to the touch as minute teeth would do. The gill-rakers on the other arches are tubercles also covered with bristles, and not fitting very closely together. The upper pharyngeal teeth are cardiform, and show as two patches each side, the lower in each case being roughly circular, and the upper patch fitting above it. The upper edge of each patch has stronger teeth than the rest of the surface. The lower pharyngeal teeth also have some

* A fish found in the Mediterranean.

strong cardiform teeth. This fish is furnished with strong molariform teeth in the front part of its mouth, suitable to feeding on molluscs.

OBLATA MELANURA.*

The upper pharyngeal teeth are minute cardiform ones; the lower pharyngeal teeth are villiform.

BOX SALPA.* Fig. 5 (p. 451).

Fig. 5 of the illustration has ten horny upstanding gill-rakers, and a rudimentary one on the first branchial arch from the angle to the end of the hypobranchial, with seven on the first epibranchial. The inner surfaces of these are roughened, but not toothed. The inner side of the first, and both sides of the second, third, and fourth arches carry tubercles, but these do not fit into each other closely, and so make only a moderately fine strainer. The upper pharyngeal teeth show as two distinct patches on each side, the line of separation between the upper and lower sections being well-marked; they carry well-defined cardiform teeth. The lower pharyngeal teeth cover a space over the whole floor of the gullet without showing any line of separation down the middle, but the arches are not united. There is a row of extra large cardiform teeth on the inner edge, with smaller cardiform teeth over the rest of the toothed area. The food of this fish consists largely of seaweeds, as well as the usual diet of crustaceans.

LABRIDÆ.

This is a large family of fishes; those frequenting the British coast are known as Wrasses. Their lower pharyngeal bones are united into one bone, which materially adds to their strength, and forms a firm foundation for the rounded molar-like teeth, looking something like a piece of a miniature cobblestone roadway, that are the lower pharyngeal teeth. The upper pharyngeal teeth are generally somewhat similar in shape to the lower, but are set in two patches; they are reinforced by two bony condyles or projections from the under side of the *basi-occiput*, materially adding to the strength of the bite, and so

* Both these fishes occur in the Mediterranean.

to break up the shells of the mollusca, and also of the crustaceans upon which they feed.

LABRUS MIXTUS. The Cook. Fig. 1 (p. 454).

On the cerato-hypobranchial of the first branchial arch grow twelve short horny gill-rakers, with seven on its epibranchial. The gill-rakers on the other arches are alternate, and fit into each other. The upper pharyngeal conical teeth are in two

LABRIDÆ.

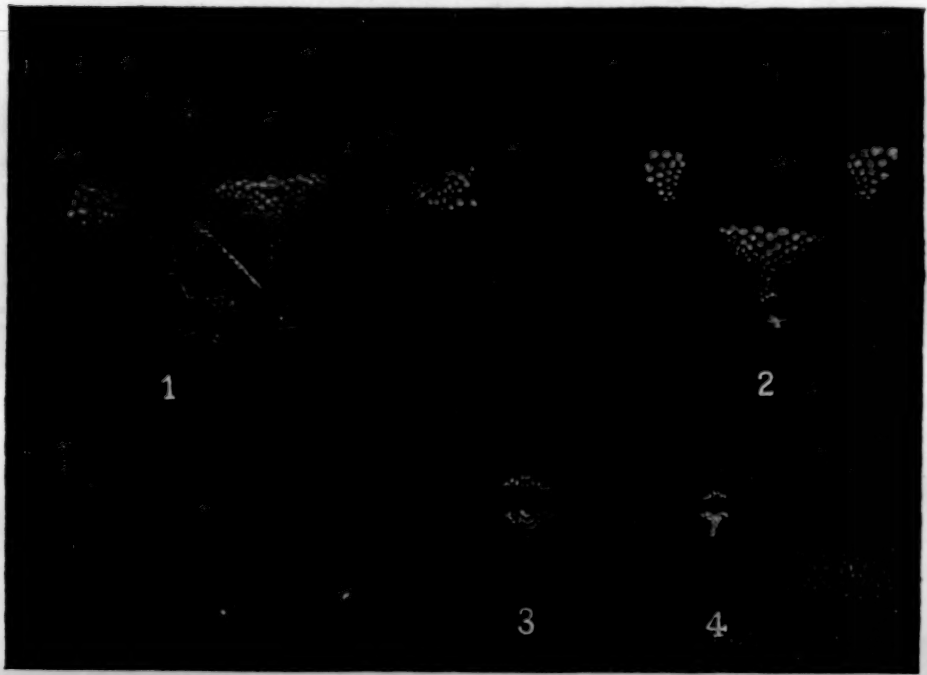


Fig. 1.—*LABRUS MIXTUS.*

Fig. 2.—*L. TURDUS.*

Fig. 3.—*L. FESTIVUS.*

Fig. 4.—*CORIS JULIS.*

sections, but looking like one that goes across the upper part of the back of the mouth, and they act against the lower pharyngeal teeth, which are similar looking teeth, but more rounded on their summits, and which go in an elongated shape across the floor of the mouth, but which throw out a promontory of teeth towards the front part as well, the teeth on which are smaller than those at the back. The gullet of this fish could not be opened back to show the upper pharyngeals distinctly, so it was

split along the centre line and opened sideways. To get an accurate idea of the working position of these teeth the extreme right and left edges must, in the mind's eye, be bent over toward each other, and the edges made to touch; this will then bring the upper pharyngeals into their correct relative position to and over the lower pharyngeal teeth. The food of this fish consists of crustaceans, molluscs, echinoderms, and fish.

LABRUS TURDUS.* Fig. 2 (p. 454).

The upper pharyngeal teeth are conical along the centre of the patch, with more rounded ones at the sides. The teeth of the lower pharyngeals have their summit more rounded than the upper pharyngeal teeth. There is a promontory of teeth projecting forward in the mouth. In the illustration those at the apex have unfortunately fallen out. The upper part of the gullet has been divided similarly to and for the same reason as explained for the last fish.

LABRUS FESTIVUS.* Fig. 3 (p. 454).

The illustration is from a small specimen; it has fourteen short gill-rakers from the angle forward. They bear one or two minute teeth on them. There are six gill-rakers along the first epibranchial. The other arches have alternate gill-rakers, on some of which are minute teeth. The upper pharyngeal teeth are conical, the lower pharyngeal teeth at the back part of the mouth are more rounded on the summit. Those at the apex of the forward promontory are conical and sharp, especially the most forward one of all, which also has a rake or leaning toward the back part of the mouth. This would prevent a shellfish being crushed by the molariform teeth from slipping forward into the mouth again.

CRENILABRUS PAVO.

The pharyngeal teeth are much the same as in the last one described. In the specimen examined several of the teeth both in the upper and lower pharyngeals showed signs of wear, as the tops of them were gone, leaving an appearance of a small dark ring, which was strongly suggestive of dental caries.

* Both found in the Mediterranean.

CORIS JULIS. Rainbow Wrass (Couch). Fig. 4 (p. 454).

This is a small fish, even when full-grown ; it has the same conical teeth in the upper pharyngeals as described above, with more rounded ones as they get towards the back of the mouth. In the lower pharyngeal teeth there is one big one with a round summit in the centre at the back, with small rounded ones at each side. Along the promontory the teeth are more conical, the two at the apex standing well up, and are sharp. The food of this fish consists of molluscs, both bivalves and single shell echinoderms, and crustaceans.

The *Scaridæ*, or Parrot-wrasses, closely allied to the *Labridæ*, are furnished with pavement-like teeth for the lower pharyngeals set in a concave shape. The upper pharyngeal teeth are set on a convex surface working on to the lower set. A specimen of these upper and lower pharyngeals of a *Scarus* are to be seen in the Fish Room of the British Museum of Natural History at South Kensington.

(To be continued.)

SOME OBSERVATIONS ON *VESPA GERMANICA*.

BY MARION BLACK-HAWKINS.

ON July 10th of this summer I discovered a wasps' nest belonging to the species *Vespa germanica* in my garden, and being anxious to study wasp economy at closer quarters than I had hitherto had the opportunity of doing, I decided to dig the nest up and transfer it, wasps and all, to my room. I prepared a glass-box for its reception, lining the sides with brown paper, and fixing dark green muslin over the top, except for one entrance-hole or rather slit, which was about five inches long and one inch wide. The front pane of glass I kept two-thirds uncovered, through which I could watch the nest at work. I hung the case on the wall above my writing-table, where I could easily see all that was going on. On July 14th I went out at 2.30 a.m. with all the paraphernalia necessary for taking the nest. I smoked two cartridges from my bee-smoker down the hole, and then stopping it up I began to dig down from above. It was in rather an awkward place on a bank, and not knowing how far back the nest lay from the entrance-hole, I was working somewhat at random, but after an hour's work I located the spot, which was about ten inches below the surface. By this time a good number of the wasps had begun to recover, and were crawling out, still too dazed to fly off quickly. I killed them as they appeared, supposing there would be plenty more in the nest when I got it out. It proved, however, to be a very small affair—four small combs, the third, which was the biggest, being five inches in diameter and fifteen inches in circumference. Moreover, there were only about a hundred wasps hatched out; of these about fifteen escaped, I captured thirty, and the rest were killed by the smoke or crushed in the digging. Most unfortunately the queen also was killed. All the combs were, however, full of eggs, larvæ, and pupæ; in some of the cells

there were two eggs. The eggs were attached to the sides of the cells, and in those cases where there were two to one cell they were attached on opposite sides. In the third and fourth combs I noticed there were two eggs to about every fifth cell. Was this due to an insufficiency of cells for the queen to lay in? Certainly there were no empty ones, and I could only suppose that the workers could not build them quickly enough for her needs.

I had either put in too much smoke or else the wasps got hurt in the digging out, at any rate they crawled about feebly, and though, after I had transferred them to the box, I spent nearly an hour fanning them, by the end of the morning they had all died, so I was left with a nest containing (I estimate it roughly) some six hundred or seven hundred eggs, larvæ, and pupæ. I found to my surprise that the larvæ were quite easy to feed, rearing themselves out of their cells as I held the comb in my hand to suck up the honey from my finger-tips. Though the size of their head was no larger than the head of an ordinary pin, they worked their jaws with such vigour that I could feel the pressure against my finger-tips. Concluding that honey alone was not sufficiently nourishing for them and they would also require some food containing a nitrogenous compound, I extracted one from its cell, killed it, and cut it up into fragments, which I then distributed with a pair of pincers among the others. They ate it with avidity! It was really wonderful to see the way they managed to manipulate the morsel with their jaws and the rapidity with which it disappeared. I decided it would be impossible to rear the whole nest, so I extracted and threw away some two hundred larvæ, leaving about two hundred distributed between the three combs—the fourth comb contained eggs only.

In the evening, four wasps broke through their pupæ-cases. They appeared rather shaky at first, took a little honey from my hand, and spent the rest of the time wandering about the combs and poking their heads into the cells. I now removed one of the combs so as to still further lessen the number of larvæ to be fed. Before I went to bed one more wasp had bitten its way out of the pupa-case, making a total of five.

The next morning, July 15th, three more wasps had completed their development, while the five of the previous evening were quite active, and appeared to me from the way they were moving about to be already tending the larvæ. I lifted the top comb out of the box, and held it in my hand to watch them more closely, and they strayed on to my hand apparently without alarm or resentment till suddenly one stung my finger most viciously. I put the comb back rather hastily, though the others were quite calm. I did not feel inclined to put my fingers too near them again, so, as they had to be fed, I placed pieces of paper well soaked in honey between the combs. They ate it eagerly, and by this means I managed to keep them well supplied with food all day. There was something rather pathetic in the eight plucky little workers trying to keep the nest going, although they had no queen and about one hundred and twenty larvæ to tend. On July 16th, when I settled down to watch them, I found they were cutting a larva to pieces and giving the little bits to the others. I don't know if it was a dead larva or whether they had killed it under stress of circumstances. Evidently the honey was not considered a sufficiently nutritious diet. I extracted several pupæ and, killing them, placed them on one of the combs. The wasps at once crowded round them, cut small pieces off, and ran away with the chunks to give to the larvæ. In fifteen minutes not a morsel was left. Some more wasps had emerged, but exactly what their numbers were I could not tell, as they moved about too quickly for me to count them. In the middle of the morning one bolder than the rest flew out of the box, and after a moment's zigzagging in front of it, evidently to memorize its position, it darted out of the window. In three and a half minutes it was back again, flew straight to the box without a moment's hesitation and disappeared within. What a marvellous memory they have!

On July 18th I put in the box during the course of the day seven dead pupæ, six caterpillars, a blue-bottle fly, and half an ounce of honey, but by 7.30 p.m. not a scrap of any kind was left. Moreover, five or six of the wasps were in and out all day foraging for themselves. More imagos had emerged, in fact, each day now added its quota of fresh members to the com-

munity, and there must have been sixteen or seventeen. It only took them half an hour to get through a quarter of an ounce of honey ; they never appeared to rest for a moment, and all their movements were marvellously quick. I was much struck by the use they made of their first pair of legs while cutting up the caterpillars. They stood reared up on the two *back* pair of legs, using the front pair to hold the morsel, and with these, together with their jaws, they manipulated the morsel with as much ease and freedom as I could have done with my two hands. After a close scrutiny in two cases (and I was able to verify it again later), I noticed that the calcaria were used like the prongs of a fork to hold the morsel in place and prevent it from slipping too far up between the legs. It was on this day also that they started building a paper envelope round the combs, for I had destroyed the original one when I dug up the nest. I had noticed that they were apparently nibbling on the top and round the edges of the combs, but I could not make out what they were at. However, half-way through the morning there was no possible doubt, for two large pieces were already made and they were hard at work on them. The rapidity with which they worked was nothing short of amazing. They took the edge *lengthwise* between their jaws, bending it about and depositing a fresh layer of material on it. A piece held up to the light displayed the structure perfectly, for it showed a series of lines where the fresh material was added, in just the same way as the lines show the increase of an oyster-shell.

During the course of the summer I had several opportunities of watching wasps scraping up the fibres of wood used in the construction of the nest, as there were some old palings in the garden which were evidently a recognized place for wood-scraping. It took them on an average about two minutes to collect the bundle, which was rolled up in a little pellet (in which action the fore feet assisted) and carried among the mouth organs behind the jaws, so that from in front of the wasp one could not see it. In this way the jaws were left free for scraping, and whenever the pellet became likely to slip away, the front pair of legs were used to push it forward again into the mouth organs. I noticed that they always walked *backwards* when

they were wood-scraping. Sometimes they tore up the end of a splinter, and then there was great trouble in breaking it off. Either they abandoned it, or else, holding it firmly in their jaws and steadying it between the first pair of legs, they stood firm on the others, and then threw their body from side to side, tugging and pulling at the splinter till it broke off.

Once the first layer of the envelope was completed, they used to ventilate the nest at night by waving their wings up and down with very rapid vibrations, which in the confined space between the combs produced a noise similar to a cat purring. They generally kept it up from two to five minutes at a time, then there would be a pause of varying length, sometimes an hour, sometimes only a few minutes, before the rumble would recommence. On July 19th it was very hot, and they kept up the ventilation most of the day, and I was very fortunate in seeing one wasp actually at work at it. She came up to the edge of the box, and stood there with her head down, her back arched up, and the end of the abdomen down; this position brought the thorax high up, making her into a semi-circle. She stood so for eighteen consecutive minutes, waving her wings up and down with such rapidity that they looked one broad blur. She then rested for two minutes, recontinued for four and a half, and after another short pause she again did it for nine minutes. It was about this date that I killed one wasp which showed the most unusual coloration of the head. The trapezoidal-shaped spot and the antennæ were wine-colour, and the vertex had a broad yellow band across it which met the yellow spots in the sini of the eyes, making it one continuous yellow band from sinus to sinus.

All this time I had been keeping a careful watch on the amount of food brought in for the larvæ, and by far the largest part of this consisted of flies. Usually only the trunk of the body was brought back, both the wings and legs having been carefully bitten off, but occasionally they were left on. Sometimes also they only brought back the thorax, or the thorax and the head. On July 28th I counted the number of flies brought into my nest during one hour. I commenced counting at 11.15 a.m., and by 12.15 they had brought in no fewer than

two hundred and twenty-seven. The numbers per minute were as follows :—

1st minute, 5 flies	21st minute, 2 flies	41st minute, 6 flies
2nd " 2 "	22nd " 4 "	42nd " 4 "
3rd " 7 "	23rd " 3 "	43rd " 3 "
4th " 6 "	24th " 5 "	44th " 3 "
5th " 2 "	25th " 2 "	45th " 5 "
6th " 2 "	26th " 3 "	46th " 2 "
7th " 4 "	27th " 4 "	47th " 4 "
8th " 5 "	28th " 3 "	48th " 5 "
9th " 1 "	29th " 5 "	49th " 6 "
10th " 3 "	30th " 3 "	50th " 2 "
11th " 2 "	31st " 4 "	51st " 2 "
12th " 2 "	32nd " 3 "	52nd " 5 "
13th " 6 "	33rd " 2 "	53rd " 1 "
14th " 6 "	34th " 3 "	54th " 0 "
15th " 7 "	35th " 4 "	55th " 2 "
16th " 6 "	36th " 6 "	56th " 3 "
17th " 7 "	37th " 4 "	57th " 6 "
18th " 4 "	38th " 6 "	58th " 6 "
19th " 5 "	39th " 2 "	59th " 8 "
20th " 1 "	40th " 2 "	60th " 1 "

I counted them on several other occasions, and with much the same results. The number of imagos in the nest at this time was not more than sixty. The bulk of the food brought in was always flies, but there was also a small percentage of miscellaneous items, chiefly fruit. Several times I saw honey-bees or parts of them being carried in. As the sun rose later they ceased to start work so early. When I first had them they would commence work at about 3.15 a.m., but gradually it got later, till by August 1st they were seldom out before 4 o'clock, and they stopped work about 8.30 p.m. But these were long hours when one remembers that they are in a state of ceaseless activity the entire day, apparently seldom stopping for even ten minutes' rest.

The problem which now presented itself to me was what would happen when all the original eggs had reached the pupa stage and there was no more work for the wasps to do; for the queen being dead, there would be no more eggs laid for them. Would they lay eggs themselves, or would the nest come to an abrupt end? I reckoned that the original eggs must all be developed by Aug. 14th, and they would have reached the pupa

stage by Aug. 5th. On Aug. 6th I noticed a great slackness in work; only a little food was brought in, and a general inertness seemed to prevail. Some of the wasps still kept hard at work, but a large percentage spent their time motionless on the nest and the sides of the box, or else in cleaning each other. This state of things lasted till Aug. 13th, when I noticed that something of the old activity was resumed, and a larger supply of food was being brought in. It was therefore obvious that, since the original eggs must have passed to the pupa stage by now, one or more of the workers had themselves laid some.

I was now away for a few days, so do not know what happened, but on my return on Aug. 28th I found a number of drones in the nest. They continued to increase in numbers for the next few days till there were quite thirty of them. They were very sluggish in their movements, crawling about the window the whole day, with occasional flights outside, and creeping back to the nest at night. They were also extremely greedy, feeding on the honey I put in the box for them till they were positively bloated, and could hardly crawl out of the dish and back to the nest, dragging their honey-distended abdomens on the ground as they went. It was obvious that the nest was breaking up, for the workers had ceased all work, many of them died, and the rest were entirely devoid of energy. Since many of them had died in the nest, it became tainted, and I was forced, on Sept. 7th, to throw it away, although there were still some half-dozen wasps or so crawling about it.

NEW BRITISH HENLEAS.

BY HILDERIC FRIEND, F.L.S., F.R.M.S.

THE list of British Oligochæts is steadily growing. Aided by a Government grant, I have this year been able to adopt means whereby the minuter species are easily discovered, and it is here that our richest harvests are at present being gleaned: The genus *Henlea* was created by Michælsen in 1889, in honour of the naturalist Henle. It consists of a number of Enchytræids with colourless blood, simple spermathecæ destitute of diverticula, and nephridia whose anteseptal portion is small. There are no dorsal pores, the œsophagus goes suddenly into the intestine in the eighth or adjoining segments, in which the dorsal vessel arises.

Beddard's splendid 'Monograph of the Order Oligochæta' (published in 1895) gives us four species as being then well-known, while reference is made to others which were doubtful. There was nothing, however, to suggest that any one of these was to be found in England, though all were known to be European. I had, however, in 1892 found one species (*Henlea ventriculosa*, d'Ud.) in Yorkshire and Essex, and in 1896 I again discovered it at Cockermouth. In the former year I also obtained specimens of another species (*H. leptodera*, Vejdovsky, = *H. nasuta*, Eisen) between Woodhouse Grove and Bradford, as well as from Essex, while I found it again in Cumberland in 1896 (see 'The Naturalist,' 1896, p. 298, and 'Essex Naturalist,' 1896, vol. ix. p. 110). These were, I believe, the first British records.

In 1907 Mr. Southern ('Irish Naturalist,' xvi. p. 70) confirmed my first record by the statement that he had found it in various parts of Ireland. At the same time he reported the occurrence of a further species (*H. dicksoni*, Eisen), and described a new species (*H. hibernica*, Southern). Thus we find that in 1907 four species of *Henlea* were known. Southern gives these, with localities, in his useful 'Contributions towards a Monograph of British and Irish Oligochæta, 1909.'

Meanwhile Bretscher and others had been at work on the subject abroad, while I was engaged upon the species to be found in England. In 1898 I found a new species of *Henlea* at St. Anne's-on-Sea, Lancashire. It corresponds almost exactly with *H. lampas*, Eisen, and as it has never yet been described in English, I transcribe my original memoranda. A small worm, about one-sixth of an inch (= 3-4 mm.) in length, thirty segments, with yellowish blood. Setæ very large, strong, and equal in length; straight, with inner edge slightly bent, extending over half diameter of the body. In one specimen the setæ were chiefly three ventral and two lateral; but in a larger specimen of forty segments, fully developed, the setæ were chiefly four in ventral and three in lateral bundles in anterior part of body, with two posteriorly. Head-pore present between prostomium and first segment. Ventral vessel bifurcating in segment three, and dorsal vessel shading off here, reappearing in about four to seven as a kind of pulsating heart. Brain notched before and behind, rather longer than broad. Found among seaweed, zoophytes, and *débris* on the shore. My own notes, like those of Eisen, are wanting in important details, for it is only within the last ten years that we have learned exactly how to describe these puzzling species. But as no other worm with which I am familiar can be produced to settle the matter I provisionally enter *H. lampas*, Eisen, as British.

The next species to place on our lists (*H. puteana*, Vejd.) is one of the four mentioned by Beddard. It cannot be confused with any other, for it is the only species in the genus with two pairs of spermathecæ, and it is in this respect unique in the whole family. I found it in Ledbury churchyard on Easter Monday of this year. It occurred with other Enchytræids among moss and algæ where water trickles over stones into a well. Unfortunately, during my absence from home the material suffered, and I was unable to study the living worms in detail as I purposed doing. For the present this remains the only known habitat within the British Isles.

Our next record is of special interest. On May 27th I went to Buxton and collected Annelids, giving particular attention to the microscopic forms. Along with *Enchytræus minimus*, Bretscher, I found *Henlea rosai*, Bret., which is slightly larger

than *E. minimus*, and has an average of thirty segments. The setæ range from three to five behind, and from four to eight in front. There are usually more setæ in the ventral than in the lateral bundles. The duct of the brownish nephridia is given off by the hinder part of the postseptal. The œsophagus enters the intestine abruptly at segment seven. The brain is about as broad as long, straight or slightly convex behind, and concave in front. There are three pairs of septal glands, and the spermathecae are destitute of glands and diverticula. Habitat: among *débris* by a wall in the Serpentine Walks, Buxton.

I come now to the latest addition to our list; and as the species seems to be new to science, it is necessary to give a detailed and explicit description. The worm is very small, and this accounts for its specific name.

HENLEA PERPUSILLA, sp. nov.

External characters.—Length of adult 2–3 mm., with about thirty segments. To the naked eye whitish, and in the microscope transparent. Setæ as few as two and as many as eight. As a rule four to six occur, those behind being long and equal, those in front being a little shorter and unequal. The girdle covers the twelfth segment and reaches to the setæ of the thirteenth. Sometimes it falls short of the setæ, at other times it just exceeds them. The head is slightly glandular, but this is a very variable character in all *Enchytræids*. The irregular cells of the girdle are not arranged in distinct rows as is often the case, nor have they the sharp definition which one finds in some other species.

Internal characters.—As the brain varies in all these creatures with tension, it is best to observe the organ at rest. In the present case then it is nearly or quite twice as long as broad, convex or straight behind, and concave in front, as in the last. The œsophagus suddenly merges into the intestine in the eighth segment, and the chloragogen cells commence in the seventh; they are often arranged in longitudinal rows. There are three pairs of septal glands in segments four-five to six-seven, not differing in any material way from the typical forms. Coelomic corpuscles, which often appear cigar-shaped or elliptical when floating, are

circular or discoid when free. The dorsal vessel arises in segment nine; the segments eight, seven, six have an enlarged pulsating vessel, which then contracts, and the blood appears to be *shot* through the narrow portion. I could find no traces of salivary glands, even in a rudimentary state, in any of the specimens examined. The nerve is enlarged in the foremost segments, and the pharynx is evertible, so that one can observe it being used in taking in food. I noticed this peculiarity in another species many years ago.

The spermathecæ, as usual in this genus, are destitute of glands and diverticula. In one specimen I observed traces of an enlargement of the duct about the middle, but usually the organ is simple and uniform in size, and opens into the intestine. This is one of the species which is destitute of œsophageal glands. In one specimen the first nephridia were situated in segment five-six, but in other cases I could not trace them earlier than six-seven. These organs are of great importance in diagnosis. I find that they differ somewhat widely in this species. In the front segments the anteseptal is often very brown and somewhat large, while the duct springs from the anterior third of the post-septal. Behind, however, the duct is a continuation of the posterior end of the organ. It is then about two-thirds the length of the postseptal. It frequently happens that many oil-cells are present, and in one instance the rich yellow colour gave a golden hue to the specimen. The ampulla, found in the neighbourhood of the girdle in pairs, is very small, pear-shaped, hardly longer than broad, while the duct is very narrow. It will be seen that the new species in some respects resembles *H. tenella*, Eisen (originally described as *Archienchytræus tenellus*). Eisen, however, does not distinguish two kinds of nephridia, and the two present the following differences:—

H. TENELLA, Eisen.

Brain nearly as long as broad, notched before and behind.

Ampulla more than twice as long as the middle is broad; spindle-shaped.

Length 8-10 mm., with about fifty segments.

H. PERPUSILLA, Friend.

Brain about twice as long as broad, concave in front, convex behind.

Ampulla hardly any longer than broad; pear-shaped.

Length 2-3 mm., with about thirty segments.

I may here give a tabular summary for purposes of future reference:—

Species.	First described.	British records.
<i>Henlea ventriculosa</i> , d'Ud.	1854	1892
<i>H. nasuta</i> , Eisen (= <i>Enchytræus leptodera</i> , Vejd.)	1878	1892
<i>H. lampas</i> , Eisen	1878	1898
<i>H. dicksoni</i> , Eisen	1878	1907
<i>H. hibernica</i> , Southern	1907	1907
<i>H. puteana</i> , Vejd	1877	1911
<i>H. rosai</i> , Bretscher	1899	1911
<i>H. perpusilla</i> , Friend	1911	1911

It is in some respects fortunate that, so far, nothing has been written about these puzzling annelids in English, save by Southern and myself. We are thereby saved a great deal of confusion, and our British records can now be made in a satisfactory manner. As I am engaged on a Monograph of British Oligochaets for the Ray Society, I should be greatly obliged if readers would send me specimens of white worms, earthworms, or waterworms from different localities. Address: 110, Wilmot Road, Swadlincote, Burton-on-Trent.

Addendum.—Since the foregoing was sent to press I have found a further species of *Henlea*, which agrees in so many particulars with *H. tenella*, Eisen, mentioned on p. 467, that I record it provisionally under that name. There are three dorsal and four to five ventral setæ. The œsophagus widens in segment eight, and the nerve ganglia are enlarged in front. Eisen's description does not allude to the presence of a row of vacuoles or glandular cells, such as I find in each segment just in front of the setæ. The brain is mobile, but agrees with Eisen's notes. As the Continental authorities have recently added several new species, and given fuller details, it is possible that the new record may eventually be found to agree with one or other of these. Locality: Acresford, Ashby-de-la-Zouch, Nov. 28th, 1911.

NOTES AND QUERIES.

MAMMALIA.

Fidelity in the Dog.—The following instance of a dog's fidelity, the truth of which I am able to vouch, seems to me to be worthy of being recorded. About a fortnight ago the proprietor of the principal inn in this village, who was also a large farmer, died. A few days after the funeral a relative, who was unable to be present at it, came over to see the widow, and on visiting the grave was surprised to find a large hole scooped out in the soil beside it. Some men who were painting the church told her it had been made by the farm dog. They had driven the animal away several times, and filled up the hole, but it kept coming back, and scratched at the graveside as hard as ever. The dog has now given up doing this, but it still visits the grave four or five times every day, always returning home in a very dejected state. During his master's last illness the family could hardly keep the dog out of his bedroom; but it is a mystery to them how he knew where his old friend had been taken to, and was able to pick out the right grave. The dog is a collie.—R. H. RAMSBOTHAM (Elmhurst, Garstang).

A V E S.

Late Swallows.—A solitary Swallow—a bird of the year—was hawking for food near my house on Nov. 12th; the previous note that I have of any being seen in this district was Oct. 12th, when about one hundred Swallows and House-Martins were along the Severn meadows. In only one other instance have I ever seen the Swallow in the Midland counties later than October, and that at Sutton Coldfield Park, Warwickshire, Nov. 2nd, 1890, when two were together.—J. STEELE ELLIOTT (Dowles Manor, Shropshire).

In my last communication (*ante*, p. 433), for "Pouthill" read "Southill."—J. S. E.

On the Increase and the Habits of Jackdaws in Islay.—The increasing numbers of Jackdaws (*Corvus monedula*) on this island are very noticeable. I have recently gathered a few particulars from the keepers here which may be worth recording. The increase of Jackdaws has been accompanied by a decrease of Choughs (*Pyrrhocorax*

graculus) on the coast-rocks, though to what extent the two changes are connected I feel doubtful. According to "the old men," the Jackdaw was only known as a winter visitor in their young days. This, as far as one can discover, goes back to a time sixty or seventy years ago. It is long since that time that they began to breed here. The cliffs appear to have been first resorted to. Within the last six or seven years Jackdaws have taken to breeding in the rabbit-holes on the sandhills. This habit of the bird is, of course, well known, and for a number of years before they began to nest in the rabbit-holes here I am told that they had done so on a small uninhabited islet off Port Ellen. I was not here during the breeding season, but, according to my informant, there were this year "scores" of nests in the sandhills. Some were at the entrance to the holes, some a yard or more down. There were also a few Jackdaws' nests in spruce-firs in the plantations near Islay House.—HAROLD RUSSELL (Islay House, Islay).

Grey Phalarope at Yarmouth.—A fine example of the Grey Phalarope (*Phalaropus fulicarius*) was obtained here on Oct. 28th. When first seen on the wing the gunner thought it was a Dunlin, but suddenly it settled in the middle of a dyke which runs parallel with Breydon Broad. His suspicion was then aroused, and he thereupon secured the bird, and brought it to me the same day. This neat little species seems to prefer small ponds and dykes to Breydon and other large tidal estuaries, for in the former they are better able to obtain their food.—B. DYE (Yarmouth).

Gulls hawking for Insects.—Referring to the note on this subject (*ante*, p. 433), this is a habit of *Larus ridibundus* I have often watched. Many an evening we used to sit in our garden in Perthshire (quite near a large gullery) and watch these graceful birds hawking moths out and in and through the trees. Their movements at such times were very similar to the Swallows and Martins. This went on every evening. — T. THORNTON MACKETH ("Burndale," Kilmacolm, Renfrewshire).

THE habit of hawking for insects is not unusual on the part of Black-headed Gulls. They may often be seen thus engaged on summer and early autumn evenings. For other records, see Ussher and Warren, 'Birds of Ireland,' p. 330; and 'The Zoologist,' 1843, p. 246; 1844, pp. 455, 577-78; 1902, p. 216.—F. B. KIRKMAN (Letchworth, Herts).

NOTICES OF NEW BOOKS.

Marvels of Fish Life as Revealed by the Camera. By FRANCIS WARD, M.D., F.Z.S. Cassell & Co., Limited.

WE are familiar with the advance made in our knowledge of ornithological bionomics by the use of the camera; Dr. Ward has now applied it to the even more difficult study of the lives and methods of fishes and other aquatic animals. This extended use of the camera is only in its infancy, but the results are already of the highest importance, and have added largely to piscine lore. To observe properly and photograph fishes "swimming free in natural environment," Dr. Ward has constructed a special pond into which he can turn his fishes. "In one wall of the pond is a large open space, which communicates with an observation chamber, and between this chamber and the water in the pond is a sheet of plate-glass. Concealed in the chamber the observer can watch the fish as they appear to each other in the water. In consequence of the darkness in the chamber and the light in the pond, the glass is converted into a mirror, and the fish merely sees himself and his surroundings reflected, while the observer can plainly see into the pond. It is thus possible to observe a timid fish without disturbing him. In addition, an instantaneous photograph can be taken of moving fish under three feet of water." This is the method; the results are most informative and interesting, while a profusion of photo blocks fully illustrate the narrative. The author has also used his camera in the shallow waters of the sea around our shores, and has also given much information as to how fish photography is to be pursued.

Rigid and total abstainers will probably be somewhat shocked at the instructions given to revive fish which may arrive half-dead at the observatory, for, as is truly remarked, "many people can catch fish, few know how to keep them alive." If other means (advised) are insufficient to revive the fish, "pour a little

weak whisky and water down its mouth, or swab the gills with cotton-wool dipped in the same restorative."

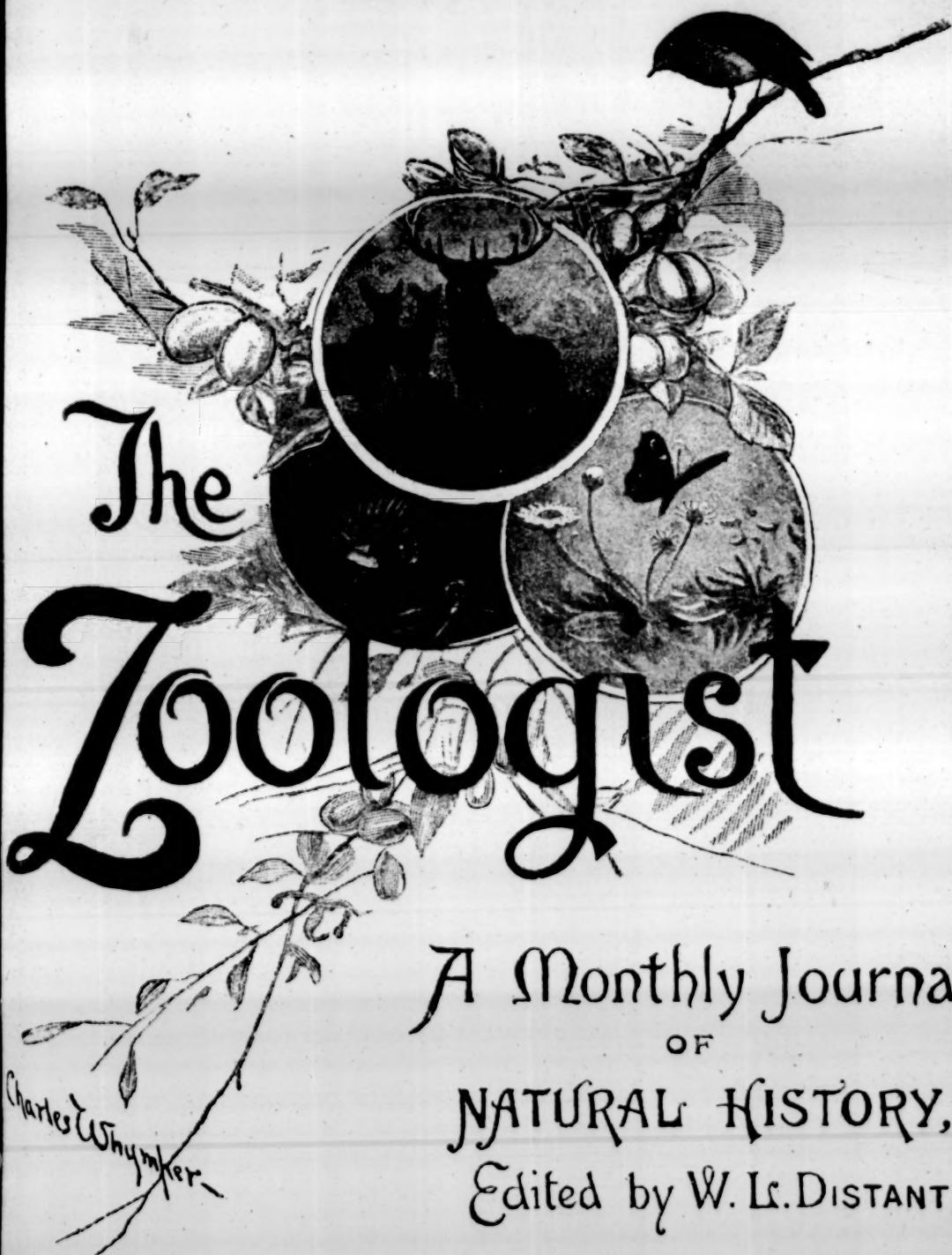
This book foreshadows a considerable advance in the study of fresh-water and marine animals, and we may look forward with every confidence to a new and popular use of the camera.

Life in the Sea. BY JAMES JOHNSTONE, B.Sc. Cambridge :
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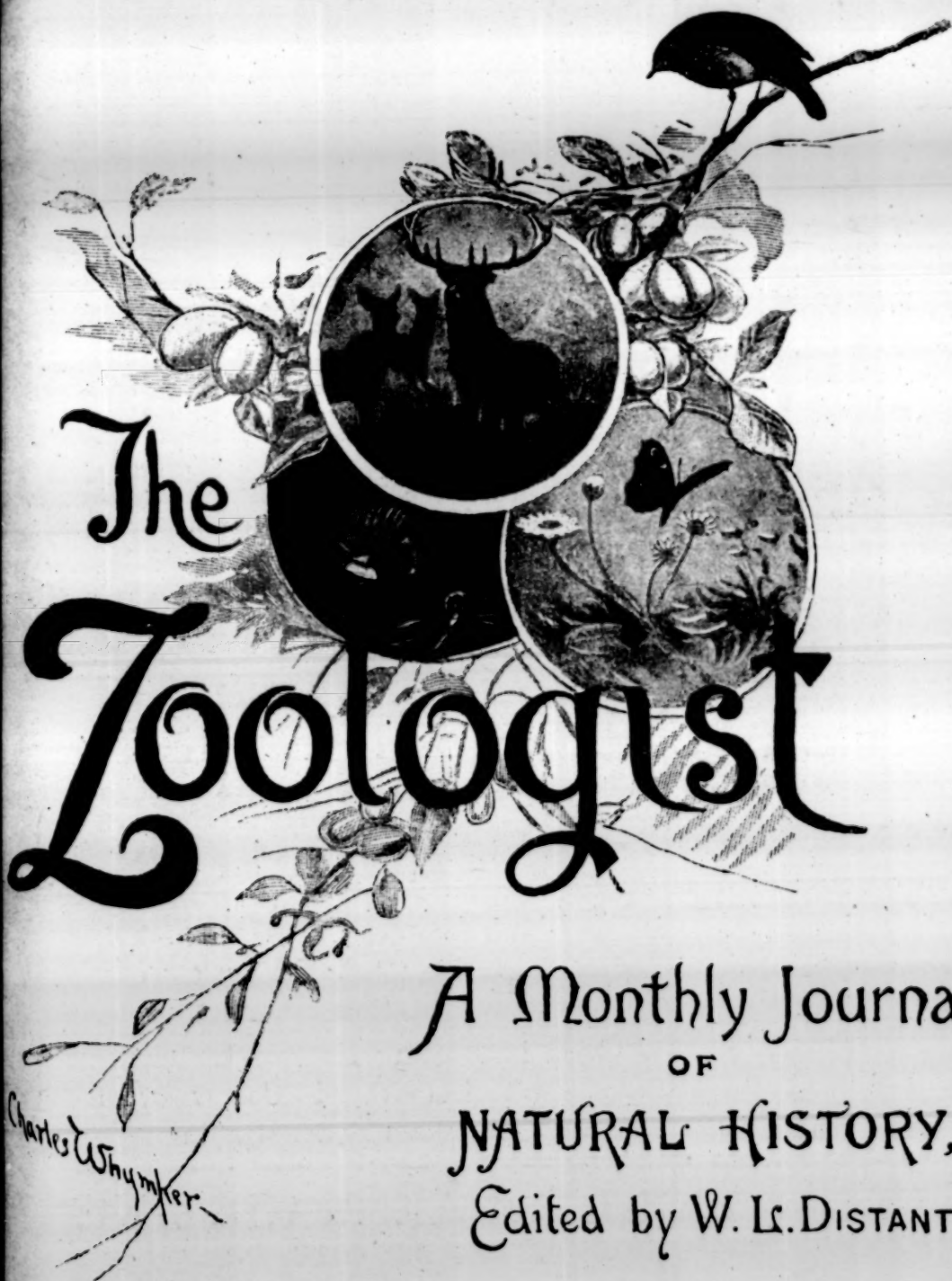
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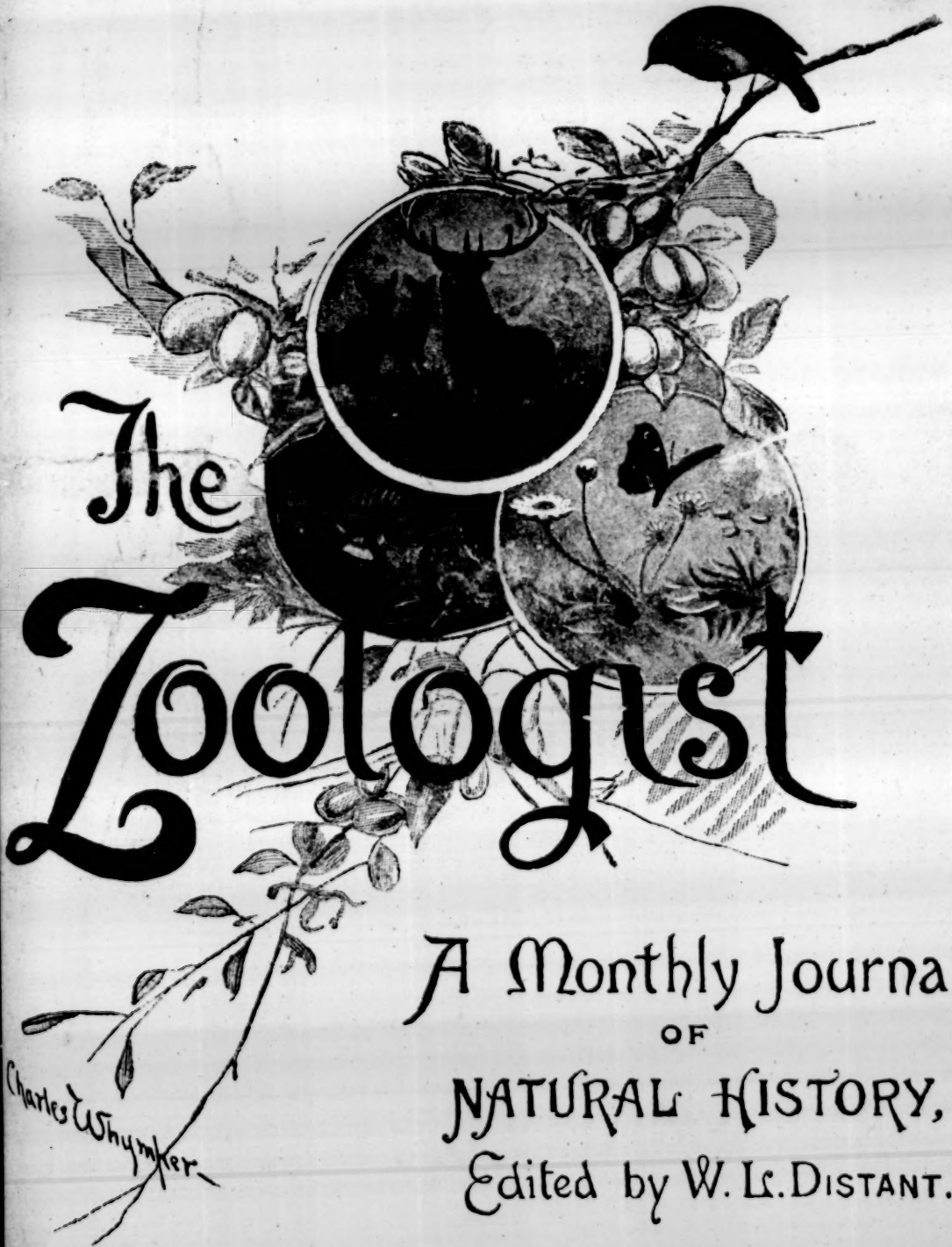
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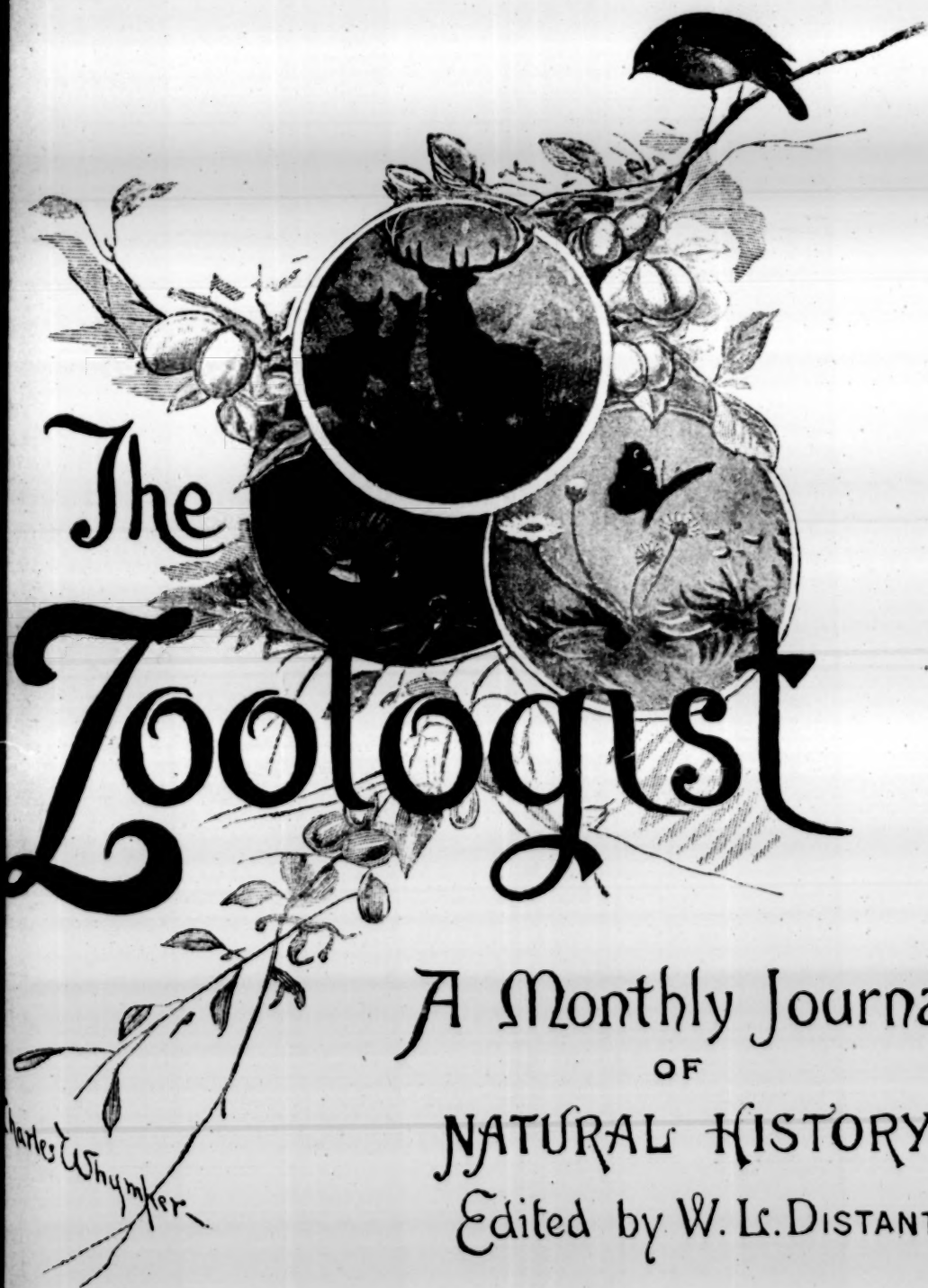
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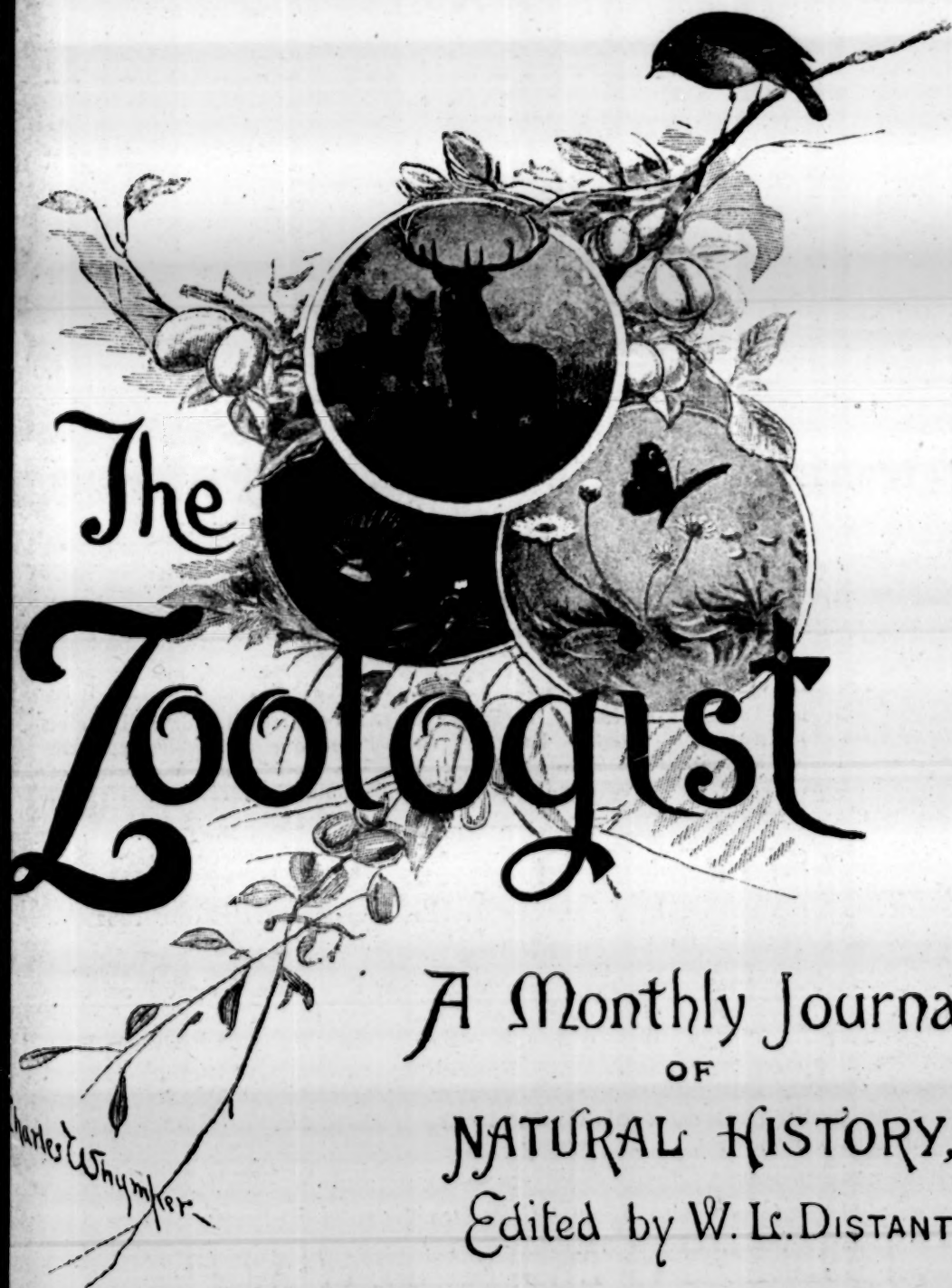
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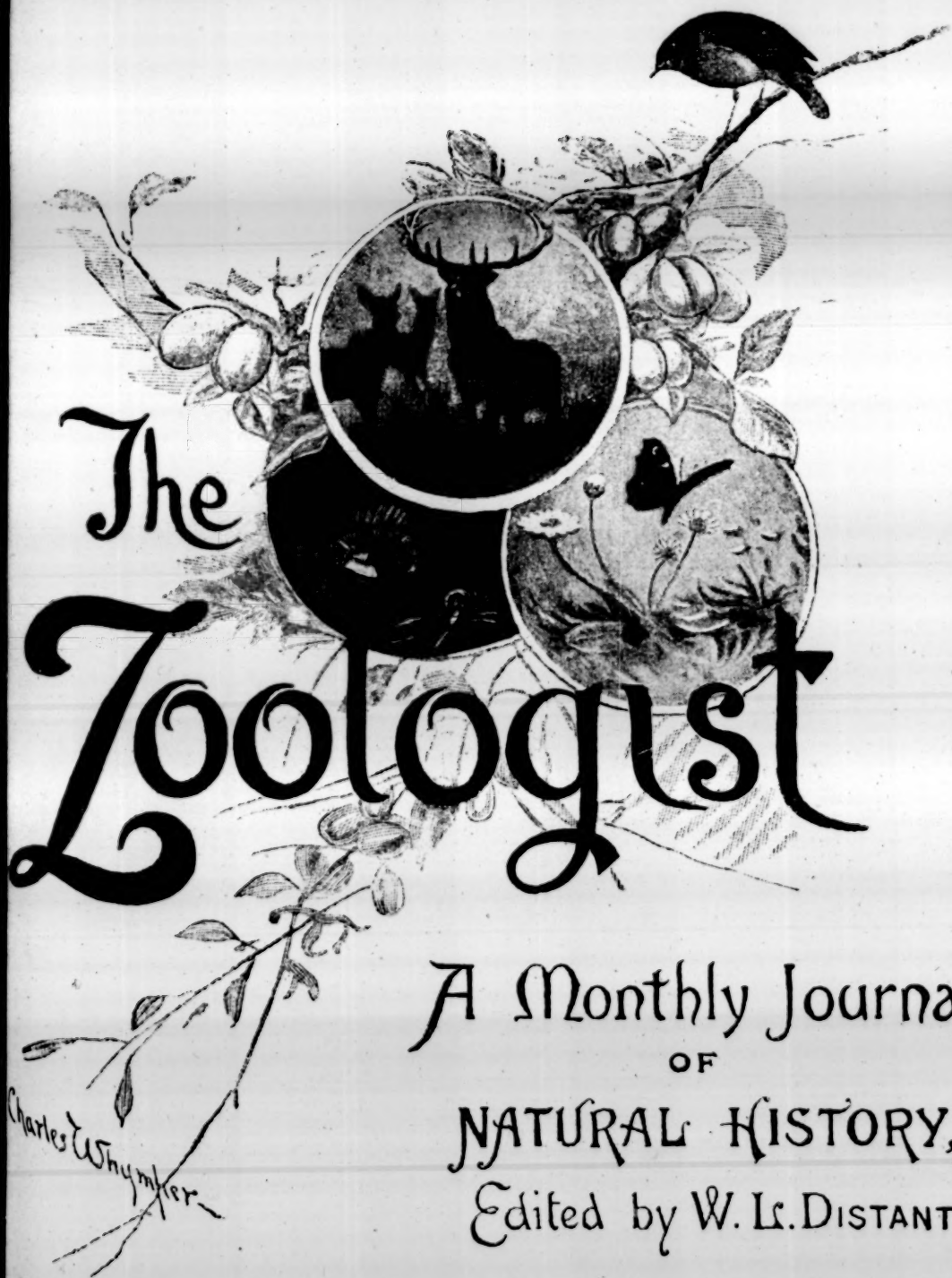
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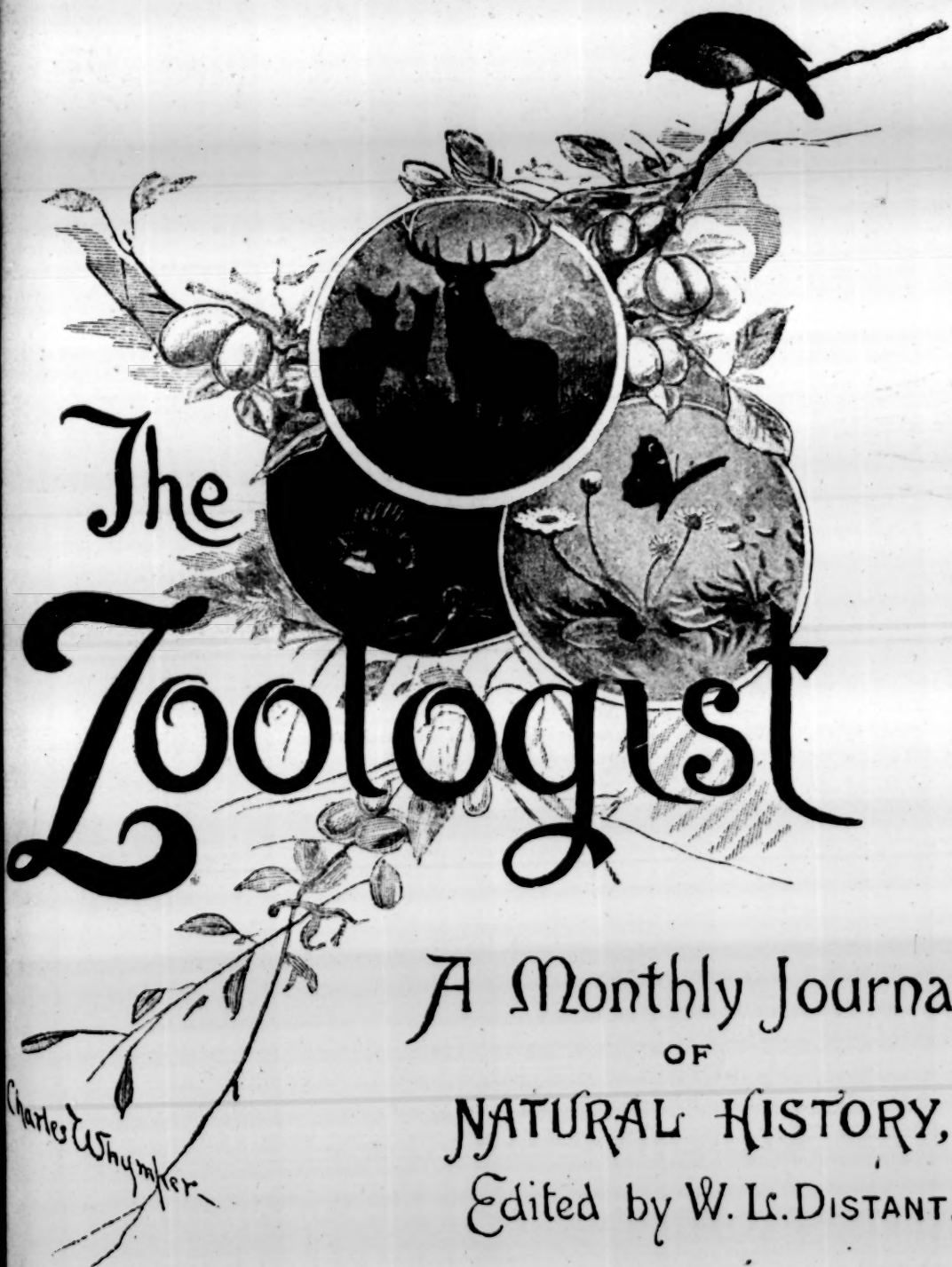
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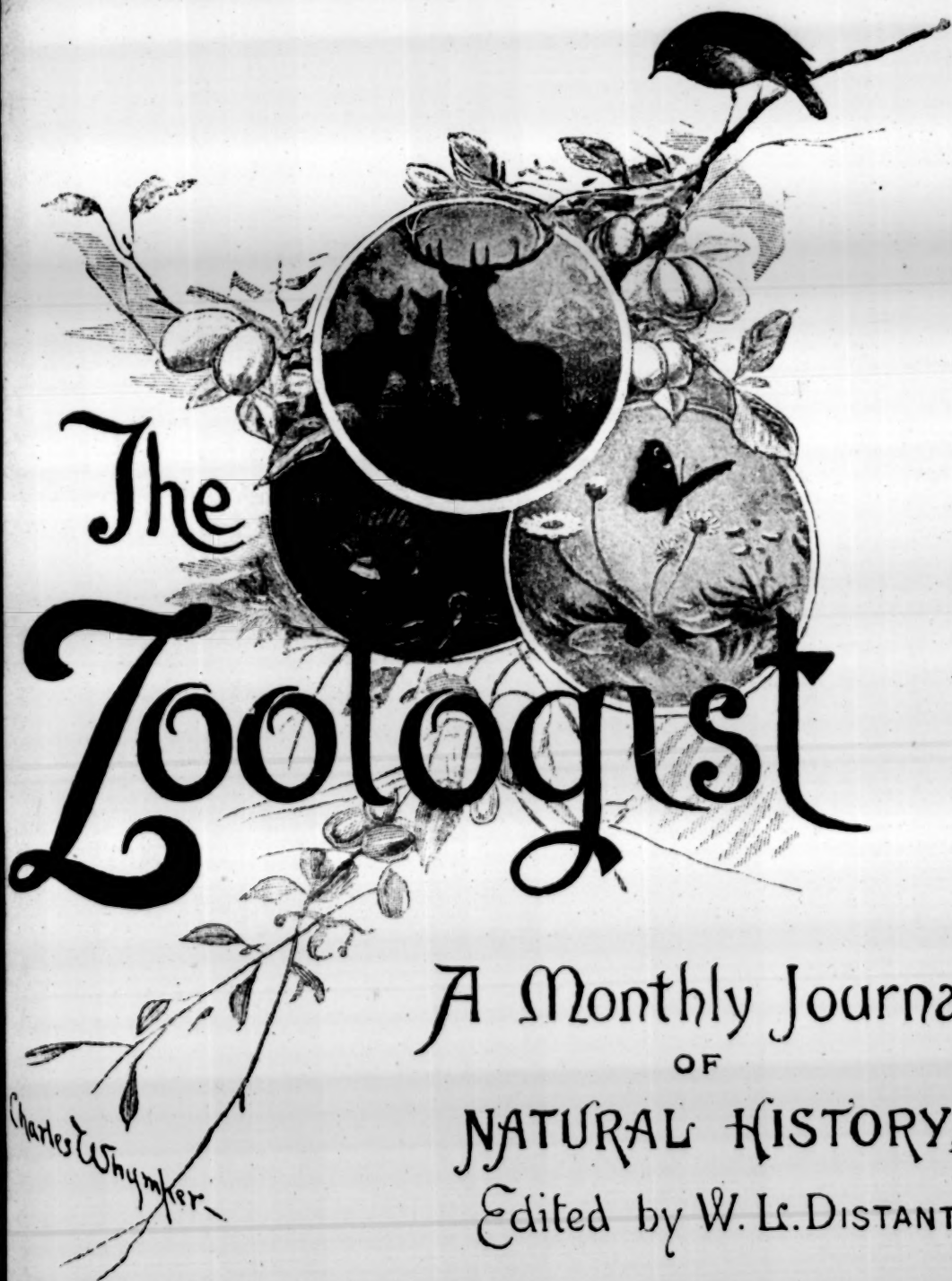
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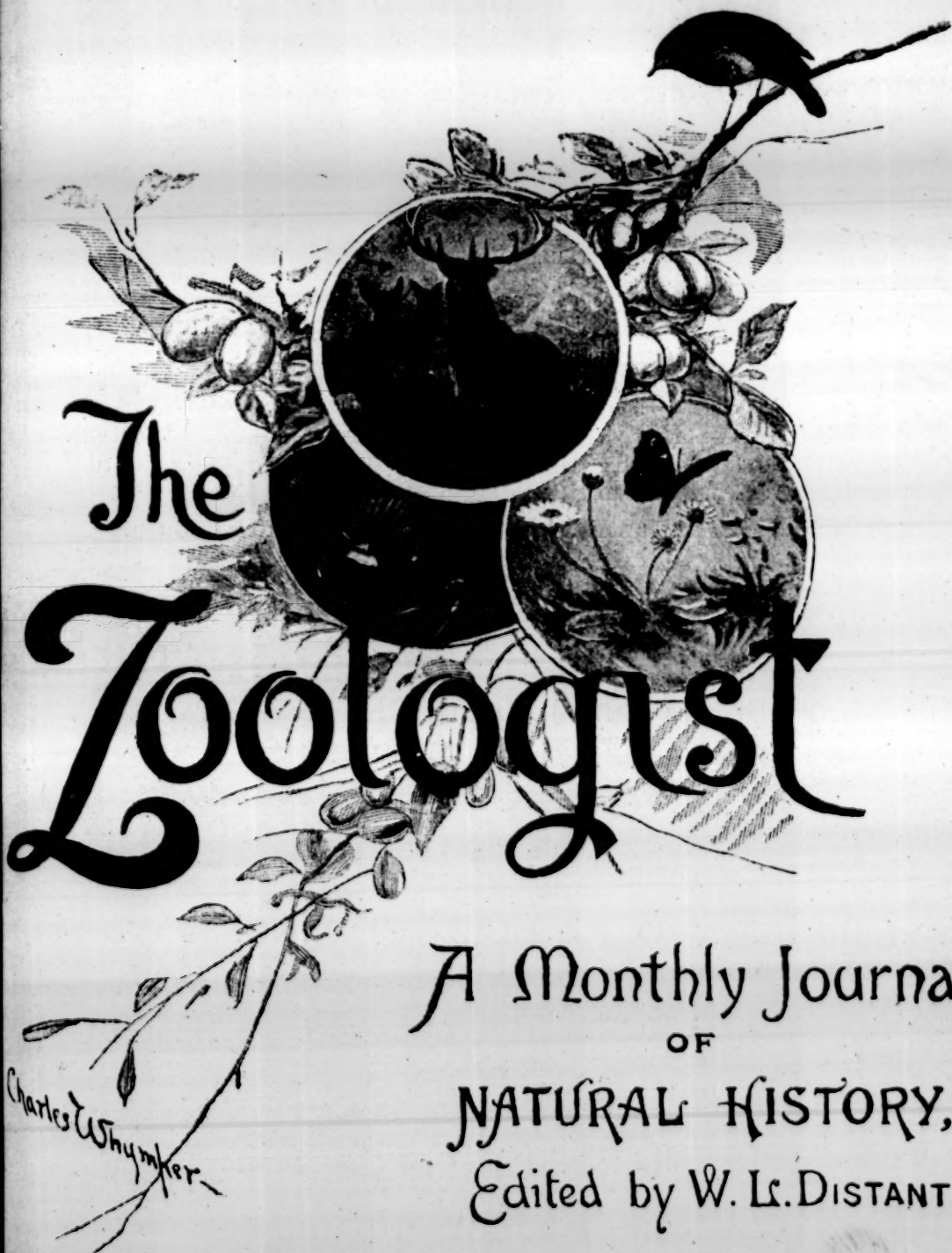
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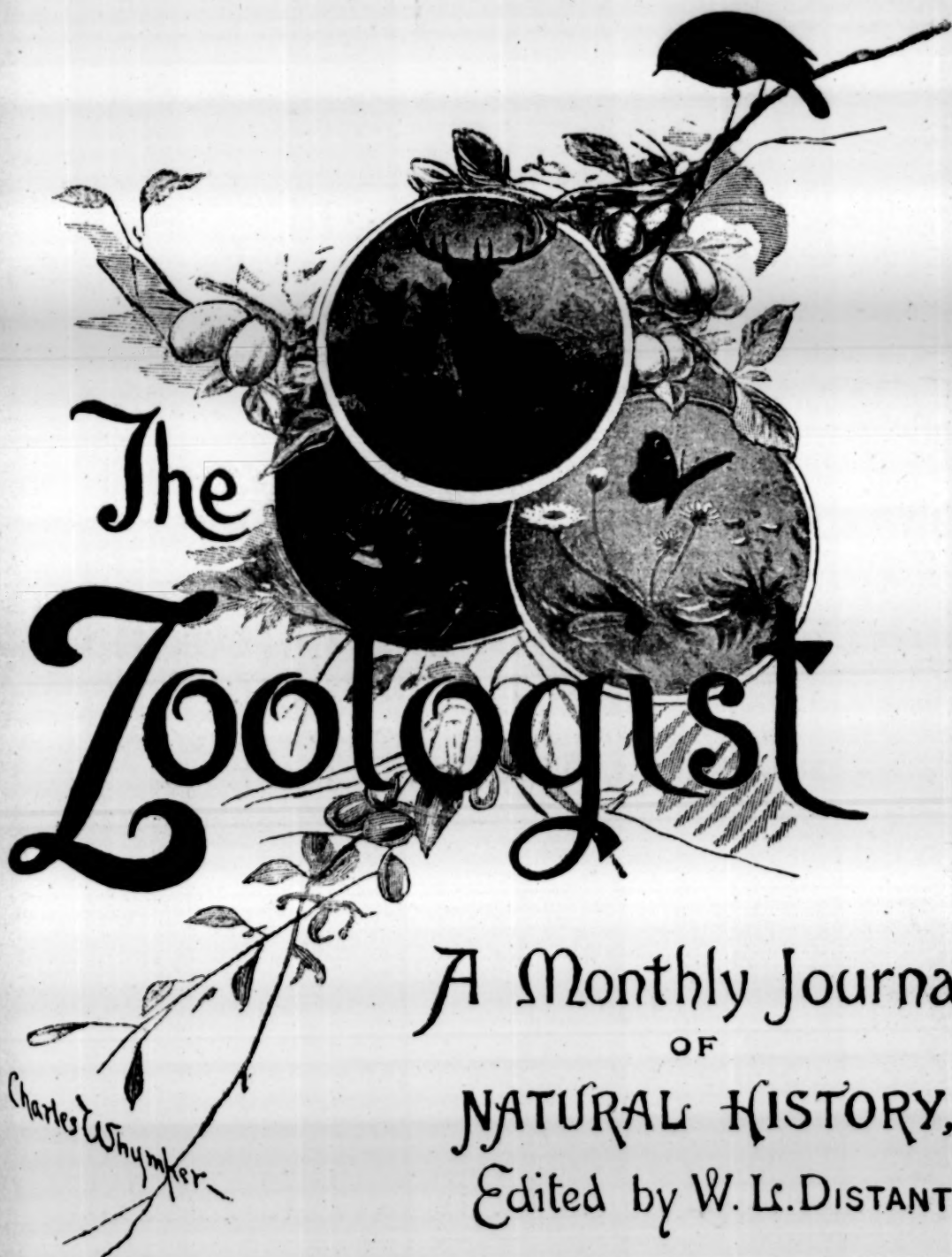
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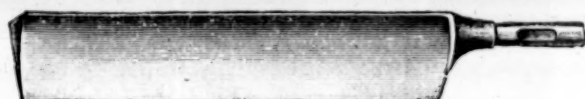
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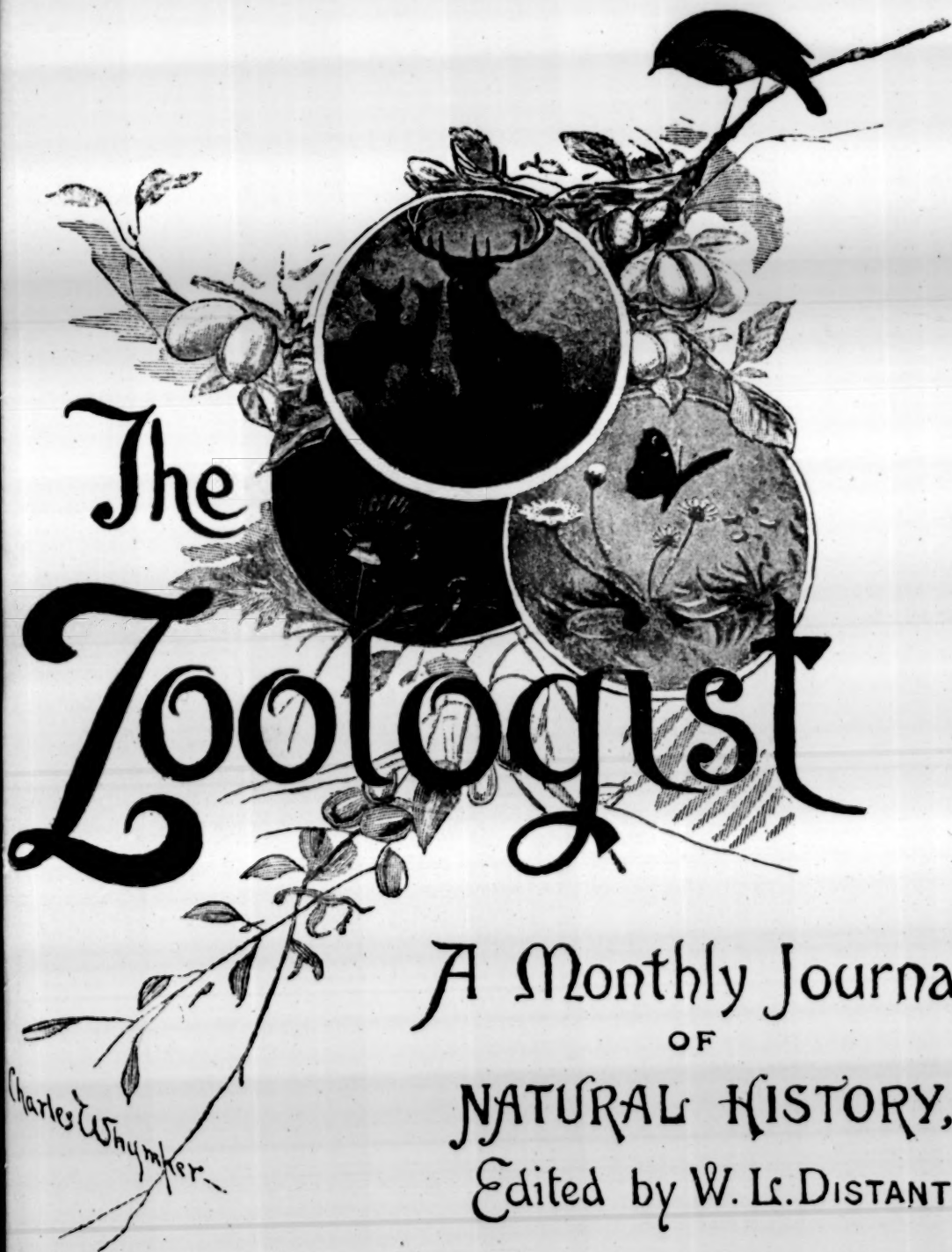
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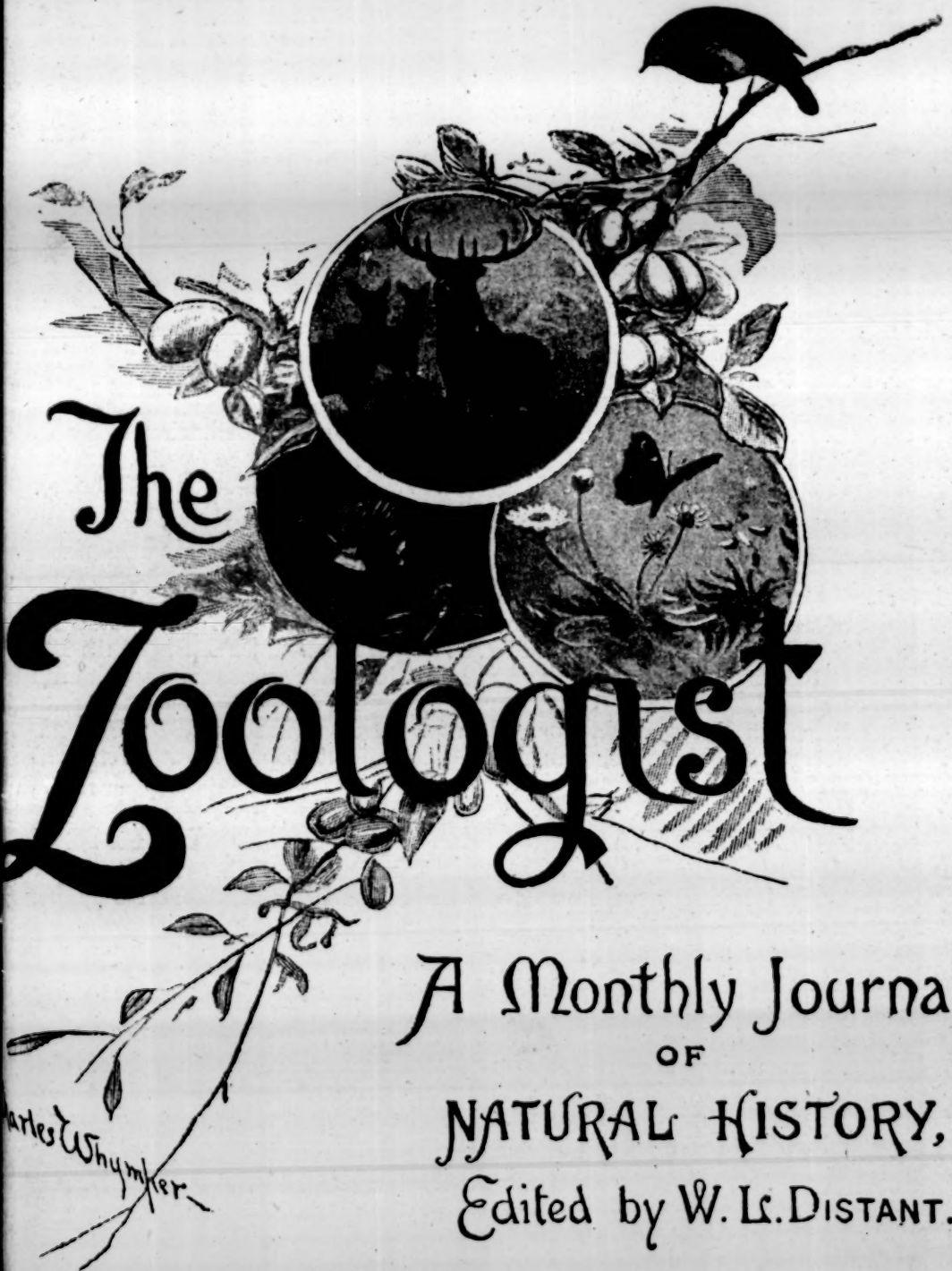
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